NOTES ON NORTH AMERICAN SPHAGNUM. IV

A. LeRoy Andrews

The Section Malacosphagnum Carl Müller

The plants of this small section present, when once known, a fairly distinct aspect in the field, due in part to a compact manner of growth with branches more or less erect, and more especially to the large size and relative thickness of the leaves together with their washed-out whitish to glaucous green color effect, features which altogether give to plants of this section more the appearance of tufts of *Leucobryum* than is the case with any other species of *Sphagnum*. The plants may, however, even show something of a brownish pigmentation. The essential characters of this section have been indicated in a previous note; with reference to the leaves it may be said that the branch leaves show the border in process of differentiation rather than as an accomplished fact, in that the outer chlorophyll cells form a fairly straight line and that the hyaline cells next within may be extremely narrowed to the point of losing their fibrils or may even be suppressed altogether, so that in places two chlorophyll cells joined form a border much as in *Acisphagnum*. The outer chlorophyll cells show the resorption-furrow as in *Inophloea*. The stem leaves possess the border of several rows of narrow cells with pitted walls characterizing *Acisphagnum*. The perichaetial leaves are particularly irregular, in that they resemble branch leaves more than is usually the case. They are, it is true, larger than normal branch leaves, but they are closely disposed at the base of the weak and short pseudopodium, somewhat spreading rather than closely clasping, generally more or less falcate-subsecund and have a form and areolation but slightly differing from that of the branch leaves. They have, however, a clearly differentiated border of narrow cells with pitted walls and lack the resorption-furrow. The hyaline cells next within this border are narrower, lack fibrils and commonly show a membrane gap in about the center of the inner surface. The stem leaves show in the same way resorption of membrane on the inner surface of hyaline cells, in case these are non-fibrillose, instead of on the outer surface as in *Inophloea*. Antheridia have mostly been noted only on the weaker pendent branches, though Warnstorf now ascribes them to the spreading branches as well, but as the antheridial leaves are in no way differentiated they are extremely hard to find. This section is also distributed widely over the earth.

8. *Sphagnum compactum* De Candolle, 1805. This old name of the species was again saved by Lindberg[1] as against *S. rigidum* Schimper, 1857, the identity being satisfactorily established by the figure of Schwaegrichen[2] drawn from a specimen sent to Hedwig by De Candolle. Apart from the general characters of the section *Malacosphagnum* already noted, the species is distinguished by the nearly central and nicely included chlorophyll cells of its branch leaves, which

---

[1] Europas och Nord-Amerikas Hvitmossor 41. 1882.

[2] Supplement I, *pl. III* (part). 1811.

cells are small and elliptical in cross section. It is also an interesting species for observations upon pores. The inner surface of the branch leaves shows, *e. g.*, very characteristically the phenomenon of pores arranged in threes in adjacent corners of hyaline cells, already alluded to in case of *S. erythrocalyx*. If these leaves are examined carefully from without and in various sections, the conditions will be found to be as follows: at the point of union of three hyaline cells there is often a common cup-shaped opening, amounting to ⅓ or ½ the thickness of the leaf; from the sides of this cup round pores enter each of the three cells. Viewing these last pores from without the leaf one sees them at an acute angle, which accounts for their often apparently narrowed shape and probably also for the fact that Warnstorf[1] speaks of them as "pseudopores" and I suspect also for Russow's statement[2] that the common walls of adjacent hyaline cells are perforated, allowing communication with each other. His explanation of how this condition must have come about shows how near he was to appreciating the real condition of things. That there is such intercommunication of hyaline cells at points where there is not at same time communication with the outside, *i. e.*, at points other than in cell corners I have not been able to demonstrate and see no reason to believe. The same arrangement is present in other species, of those already mentioned notably in *S. erythrocalyx* where Warnstorf again calls the pores pseudopores, and less strongly marked in *S. papillosum* where Warnstorf does not make this mistake, and in fact in other species of *Inophloea* as well. In all these, however, it occurs on the other (outer) surface of the leaf. On the outer surface of the branch leaves of *S. compactum* the phenomenon of pseudopores is especially marked, *i. e.*, along the commissures of the hyaline cells one sees rows of markings suggesting elongated pores, but without puncture of the cell membrane, the so-called fibril bands being reinforced by cross connections in a way admirably described and figured by Russow.[3] They are sometimes well represented on the inner surface also and may be somewhat reduced on the outer. The plants fruit not uncommonly and appear, at least in some cases, to be monoicous, but further observations upon the antheridia are desirable.

The species occurs under a variety of conditions in Greenland and along our eastern coast from Labrador to Florida and Alabama, on the western from Vancouver Island, northward to Alaska (Warnstorf accredits it to California, *leg.* Bolander,[4] but all of Bolander's specimens from California labeled *S. rigidum* which I have seen are *S. teres*). Inland it is much less common and further stations for it should be noted. It is similarly distributed in Europe and Asia and appears then to be confined to the northern hemisphere where it does not quite reach the tropics, but to the northward vies with the hardiest species.

9. *Sphagnum strictum* Sullivant, 1846. This closely related species has long passed under the name *S. Garberi* Lesquereux & James, 1879, until Warnstorf in

---

[1] Pflanzenreich **51**: 146 and elsewhere.

[2] Zur Anatomie der Torfmoose 18; *cf. pl V. fig. 58.*

[3] Ibidem 9f. *pl. I, fig. 3, pl. V, fig. 61.* The phenomenon had of course been noted long before.

[4] *Cf.* also Lesquereux & James, Manual 17.

his recent monograph[1] reduced it to synonymy with an earlier *S. mexicanum* Mitten, 1869. In his identification of these two species Warnstorf is certainly right. But the species in question has two earlier names: *S. humile* Schimper, 1856 and the one I have adopted. The identity of *S. humile* with our species has already been adequately developed by Cardot,[2] who noted that Sullivant's plate and description[3] from the type specimen collected by Rugel at Tallahassee, Fla., could not well be anything else than *S. Garberi*. That a bit of *S. molle* was mixed with the specimen, as is frequently the case with specimens from Florida, is not impossible and is in fact indicated by the fig. 12 as compared with 14, but the correspondence of most of the figure and of the description with the characters of our species shows clearly enough which of the two the author had primarily in mind.[4] Warnstorf's reduction of *S. humile* to synonymy with *S. molle*[5] rested upon a specimen collected by Lesquereux in Carolina and is consequently of no value, as Cardot has noted. I have examined two portions of type material of *S. humile* in the Sullivant Herbarium at Harvard University, both received from Schimper, and both are entirely identical with *S. Garberi*. Warnstorf seems also now to have recognized the facts, but for some reason cites the name, *S. humile*, merely as a synonym of the later *S. mexicanum*.[6] As to *S. trictum* Sullivant, it was based upon a specimen from Devil's Court House in North Carolina and issued as No. 201 of its author's Musci Alleghenienses. The inadequacy of the original description doubtless accounts for its passing into oblivion as a synonym of *S. compactum*.[7] The specimens are, however, entirely identical with what has passed as *S. Garberi* and the restoration of the early name, as it seems to me is a decided gain. I have examined the plant in several sets of Sullivant's exsiccati, including that in his own herbarium, which would, I suppose, constitute the type if there were any question. *S. strictum* Lindberg, 1872, being a synonym of *S. Girgensohnii* Russow, 1865, and later than *S. strictum* Sullivant, can present no seriou obstacle. As to the remaining synonym, *S. domingense* Carl Müller, 1898, from specimens collected by Eggers in Santo Domingo in 1887, I have not myself seen it, but it was reduced by Warnstorf already before its publication[8] to synonymy with *S. Mexicanum*, where he still retains it, and I know of no reason to doubt the correctness of the reduction.

The species is very near *S. compactum*, so much so that its value has been called into question, notably by Cardot[9], but has maintained itself and is, it seems to me, clearly distinct. It is usually a taller plant with elongated spreading or

---

[1] Pflanzenreich **51**: 144. 1911.

[2] Répertoire sphagnologique 300f. 1897.

[3] Icones Muscorum 5. *pl. III.* 1864.

[4] It should be noted, however, that Sullivant in an earlier allusion to *S. humile* (Memoirs Amer. Acad. Arts and Sciences, New Series, Vol. IV, Part I, 174f, 1849) described its leaf section incorrectly, as he did also that of *S. strictum*.

[5] Bot. Gaz. **15**: 226, and Hedwigia **29**: 209. 1890.

[6] Pflanzenreich **51**: 144. 1911.

[7] It was in fact reduced by Sullivant himself, Gray's Manual 611. 2 ed. 1856.

[8] Hedwigia **29**: 247. 1890.

[9] Révision 11. 1887.

squarrose leaves, though the Florida specimens are commonly much reduced in size and *S. compactum* may itself take on robust forms with squarrose leaves. The stem is usually greenish yellow rather than brown, the stem leaves show a tendency to hemiisophylly, the branch leaves give the really distinctive character, showing chlorophyll cells exposed on outer surface, while the walls of the hyaline cells, where overlying these, are finely papillose, a condition first noted by Warnstorf [1] These papillae are considerably finer than in the case of *S. papillosum* and may readily escape notice but will generally be seen if carefully looked for. In the Florida specimens they are often reduced or lacking. The pseudopores found in the leaf of the last species are normally entirely lacking in this, while the real pores on the outer surface may be considerably more numerous, though their number is variable and they are in some cases almost entirely absent. The plants are dioicous so far as known and they do not often fruit, though the compact forms from Florida form something of an exception in this respect. The perichaetial leaves are less strongly falcate-secund than in the last species and have a greater contingent of non-fibrillose hyaline cells within the border. I also find a difference in the size of spores, those of this species running mostly 35–45μ, while those of *S. compactum* are generally 24–28μ. Specimens recently determined by Warnstorf show a confusion of the two species, but one hardly justified by the plants themselves. Of the two numbers (121, 122) in Eaton & Faxon's Sphag. Bor. Amer. Exsic. distributed as *S. Garberi*, No. 121 is in part *S. compactum*. In several sets recently examined only the latter species was found, but in my own set, for which I am indebted to the kindness of Dr. Geo. E. Nichols, both species are present but distinguishable, as always, even macroscopically.

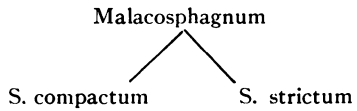
The distribution of *S. strictum* is peculiar, its stations mostly relatively remote from each other suggesting survivals of a former more general distribution, as is the case with *S. Pylaesii*. They stretch in North America from Newfoundland (or Labrador?) southward to Florida and Alabama with the single reported station in Santo Domingo and that in Mexico well southward in Oaxaca and at high altitude. I have also seen a second Mexican specimen in the herbarium of the Copenhagen Botanical Garden collected by Liebmann (Musci No. 10) and named by Schimper *S. squarrosum*. Warnstorf also reports a single station from Ecuador in South America[2] and in Europe it is known as yet only from the western coast of Norway, where it was collected by Kaalaas in 1889, but remained unidentified until seen by Jensen in 1902.[3] It is there confined to the strip of coast and islands characterized by the interesting "Atlantic flora," where I had the pleasure of observing it in quantity while collecting with Kaalaas in Söndmöre in the summer of 1907. In the summer of 1912 I saw it again at Os (Osören) south of Bergen. These field observations tend to confirm me in the opinion that it is a good species, as, though *S. compactum* was generally present

[1] Hedwigia **29**: 246f. 1890.
[2] Pflanzenrich **51**: 145. 1911.
[3] *Cf.* Kaalaas, Bryophyten in Romdals Amt 44. 1911.

in the same localities, we saw nothing at all suggesting intergrading forms, the tufts of *S. strictum* being immediately recognizable after we had once distinguished it. In fact Herr Kaalaas became very adept at recognizing the tufts at a considerable distance by the color alone, which he describes as a "bluish-white" or "bluish-green;" I should call it a whitish or slightly greenish straw-color. In the field it is more likely to be confused with *S. squarrosum* than with *S. compactum*.

Two further species of *Malacosphagnum* had previously been accredited to North America: *S. sparsifolium* Warnstorf, 1894, and *S. guatemalense* Warnstorf, 1890, the former from Guadeloupe, the latter from Guatemala. Warnstorf notes now, however, that *S. sparsifolium* was apparently from Africa[1] and accuses Cardot (1897) of citing the wrong locality for it, but Warnstorf had himself described it as from Guadeloupe.[2] It appears, then, in Warnstorf's latest work as a variety of *S. Pappeanum* Carl Müller, 1849, an African species whose description reads suspiciously like that of *S. strictum*. *S. guatemalense* its author has found[3] to be a synonym of an interesting species, *S. antarcticum* Mitten, 1859, occurring in the region of Australia and New Zealand, from which region the specimen evidently came instead of from Guatemala.

Phylogenetically *S. strictum* is apparently not a derivative of *S. compactum* nor is the opposite the case, as is shown both by characters and distribution, but their relation is quite analogous to that between *S. magellanicum* and the collective *S. papillosum-erythrocalyx*, viz.:



Both are evidently old species, as were those of *Inophloea*.

To the previous notes upon *Inophloea* may be added that I have seen portions of the types of both *S. portoricense* and *S. imbricatum* in the Sullivant Herbarium at Harvard University, that the same herbarium contains a specimen of *S. portoricense* with antheridia sent by Austin, the antheridia being borne essentially as in other species of *Inophloea*, and finally that *S. erythrocalyx* was found in New Jersey before Eaton's time, a specimen in the Sullivant Herbarium from Austin bearing notes of this keen observer and the query whether it was not *S. tenerum*. Sullivant regarded it as a state of *S. cymbifolium*, with which Austin later agreed. The locality given for it is "Pines of New Jersey."

ITHACA, N. Y.

---

[1] Pflanzenreich **51**: 152. 1911.

[2] Hedwigia **33**: 320, 334. 1894. In Engler & Prantl (I. **3**: 254. 1901.) Warnstorf still had Guadeloupe as the sole locality for it.

[3] Pflanzenreich **51**: 157.